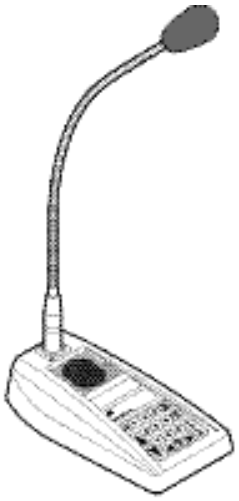
3M

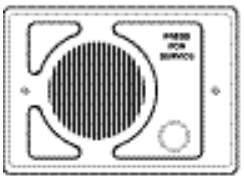
Convenience Store Intercom System

Model D-2400

Installation Instructions



Station Selector



Call Station

Communications Controller

BP-4144

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FCC Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device must not cause harmful interference.
- This device must accept any interference received including interference

hat may cause undesired operation.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Trademarks

Safety Guidelines

Warranty Information

3M Information

Call (800) 328-0033

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Revision Record

Date	Revision	Reason For Change
5/00	01	Preliminary manual released.
6/00	02	Incorporated changes from Revision 01.
7/00	03	Incorporated changes from Revision 02.
7/00	04	Incorporated changes from Revision 03
7/00	A	Released manual
8/00	B	Incorporated changes from Revision A
1/01	C	Incorporated changes from Revision B

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System Components

The 3M™ Model D-2400 Convenience Store Intercom System consists of one of the following components:

- Station Selectors
- Call Stations
- Communcations Controller

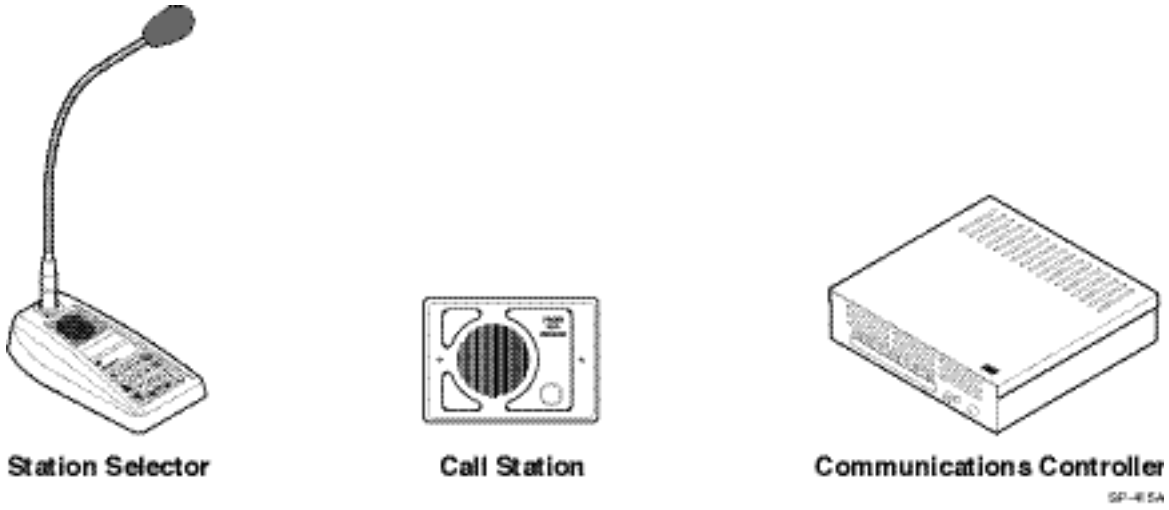

Figure 1. Model D-2400 Convenience Store Intercom System Components

Material Required (not supplied)

- Assortment of screws, anchors, and cable clamps
- Sufficient twisted pair sets of audio cable to connect other components such as Station Selector, Call Staions, etc. See Figure 1.

⚠ **Important**
The pairs of wires for the speaker connection must be shielded for proper operation.

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Component Placement

This section describes placement of the 3M™ Convenience Store Intercom System, Model D-2400, components:

Communications Controller

For proper system operation, locate the Communications Controller:

1. Near the conduit termination of the Call Station wiring.
2. Near the power source.
3. At least 10 feet away from electrical noise sources such as the following:
   - large electrical motors (such as air conditioners, freezers, and coolers)
   - any electrical components that arc (i.e., relays)
   - ballasts (for light fixtures)
4. In a secure room away from traffic.
5. Approximately 5 feet above the floor.
6. Where it is accessible from the top, bottom, and both sides.
7. In a dry and heated (between 50° and 100° Fahrenheit) location.

See Figure 2.

Power Supply

Locate the power supply as follows:

1. Install the power supply mounting bracket in a preferred location, as shown in Figure 2.
2. Insert the power supply transformer into the mounting bracket, as shown in Figure 2.

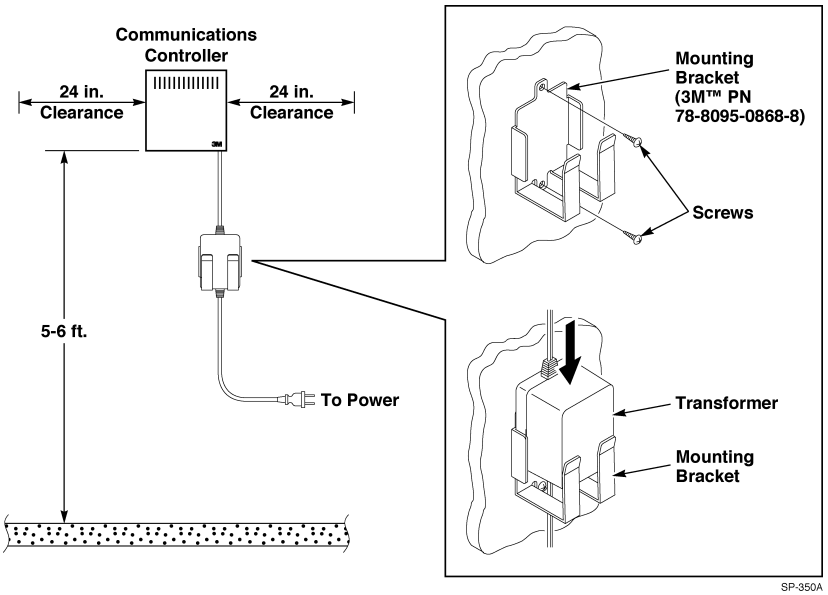

Figure 2. Suggested Communications Controller Placement

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Call Stations

For proper system operation, install the Call Stations in locations:

1. Chosen for ease of use.
2. At least 48 inches above the pavement.

✓ **Note**
Local codes may dictate placement of call stations.

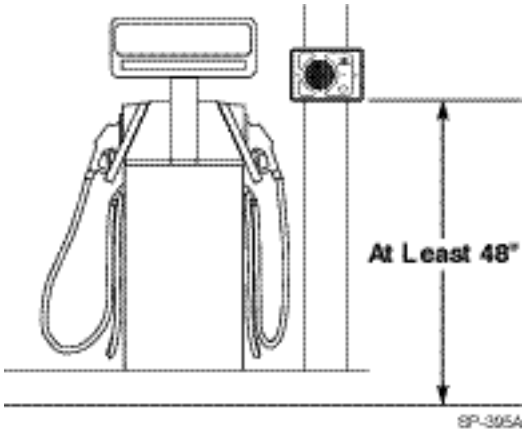

Figure 3. Suggested Call Station Placement

Station Selectors

For proper system operation, locate the Station Selectors:

1. At locations chosen for maximum efficiency.
2. On counters, mounted on pedestals, or mounted on walls.
3. In dry and heated areas.

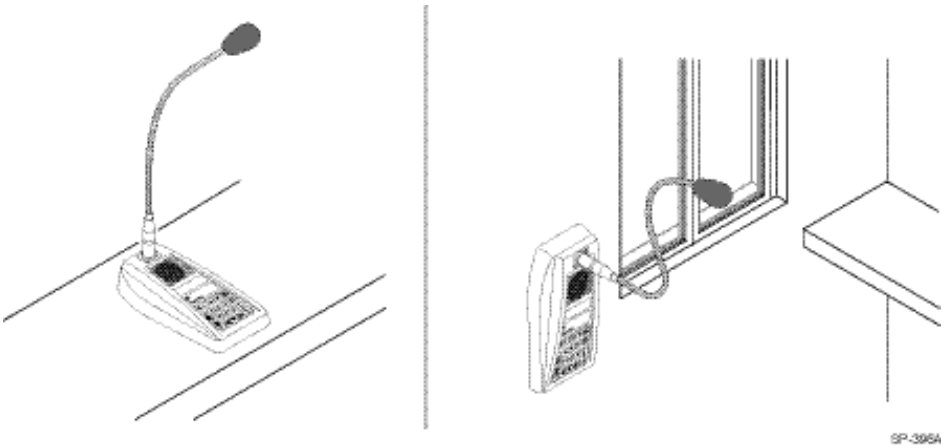

Figure 4. Suggested Selector Station Placement

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Wiring the System

Depending on distance use twisted pair, 14-22 AWG audio cable when wiring Convenience Store Intercom System, Model D-2400, components. Figure 5 shows an overview of the cable types and number of connectors required for each unit. Table 1 shows wire gauge required for different distances between components.

Note:

The RS485 cable carries DC power for the Station Selectors, requiring a larger gauge wire.

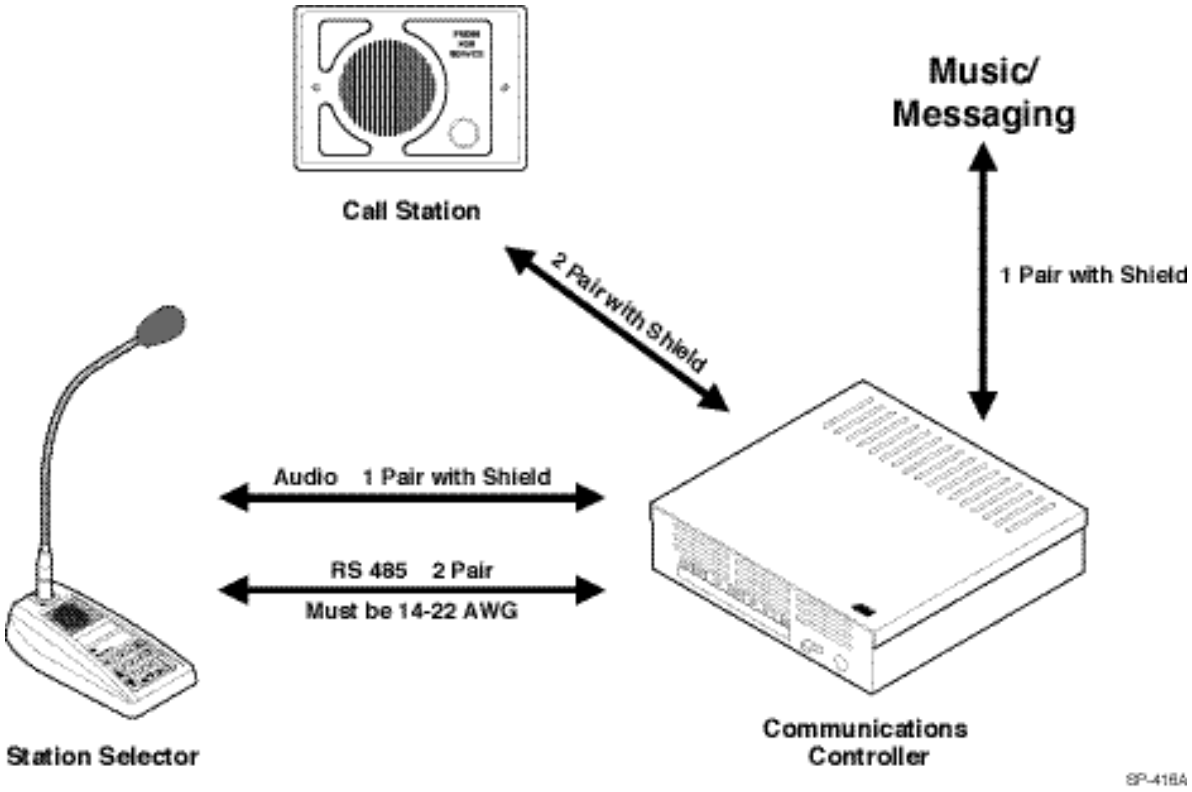

Figure 5. Cable and Connection Requirements

All Audio Wiring

Wire Gauge	Distance Between Components
22	Up to-309 feet
20	310-493 feet
18	494-783 feet
16	784-1245 feet
14	1246-1980 feet

RS 485 Cable (only)

Wire Gauge	Distance Between Components
22	Up to 62 feet
20	63-99 feet
18	100-157 feet
16	158-249 feet
14	250-396 feet

Table 1. Wire Size Requirements

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Configuration Worksheets

Use Configuration Worksheets 1 through 3 (located at the end of this document) to plan and record your system configuration. You can record the system wire locations, wire color scheme, and program settings on the worksheets. Store the worksheets in the inside cover of the Communications Controller using the service envelope provided.

Wiring Call Stations

Call Station wiring consists of the following for a one-button, four-wire system:

- 2 Speaker wires.
- Speaker shield wire (used as Common for buttons).
- Button A.

Configuration Worksheet 1 shows how to connect the Call Stations to the proper Communications Controller ports.

Station Selectors

Wiring Station Selectors involves connecting a minimum of 7 wires: 3 audio wires and 4 power and communications wires.

⚠ **Important**
The D-2400 System is powered by one power supply that provides power for the Communications Controller and a maximum of three Station Selectors. An individual power supply must be plugged into the rear of each Station Selector that exceeds the three Station Selector limit.

Refer to Configuration Worksheets 2 and 3 to determine the specific wires and connections to be made.

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Programming the System

Program the system to conform to your planned configuration and desired operation.

Hardware (Jumpers)

Select Call Station(s) to receive ALL CALL and music/messaging during STANDBY mode. (A closed jumper turns ALL CALL and music/messaging OFF. An open circuit jumper turns ALL CALL and music/messaging ON.)

1. Use the appropriate jumper to select ALL CALL and music/messaging for each call station.
2. Jumpers JP1 through JP8 (in order) on the Main Board apply to Call Stations 1 through 8; jumpers JP9 through JP16 (in order) on the Expansion Board apply to Call Stations 9 through 16.

The locations of the jumpers are shown in Figure 6.

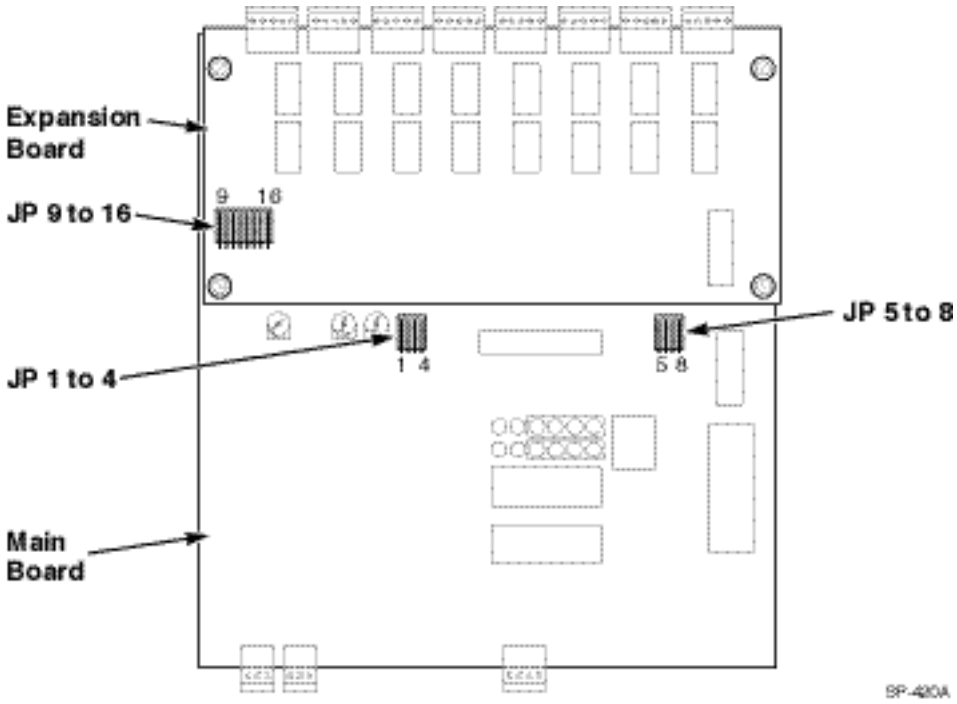

Figure 4. Communications Controller Jumpers

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Programming the Selector

Programming State

To program the D-2400, it is necessary to put the system in the programming state. From this state, the entire system is configured and all memorized parameters are adjusted.

To enter the programming state, simultaneously:

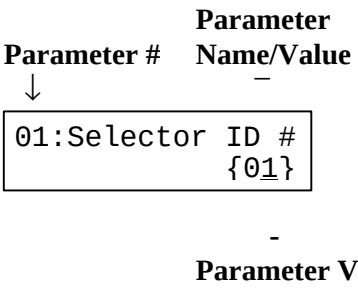
Press and hold the STD BY key.

Enter the numeric code: 97531.

The display shows:

```
01:Selector ID #
              {01}
```

The Parameter #, Parameter Name/Value, and Parameter Value fields are as shown below.



The _ indicates cursor position. To move the cursor from one field to another, use the Left Arrow and Right Arrow keys.

To input data at the cursor position, do one of the following:

- Use the Up Arrow and Down Arrow keys to scroll to desired value.
- Use the 1, 2, 3, 4, 5, 6, 7, 8, 9, 0/Menu keys.

The STD BY key clears a field to a default value (space for text or the default value).

The HOLD key shifts case for text data.

The ALL CALL key exits from the programming state and enters the Off Line mode.

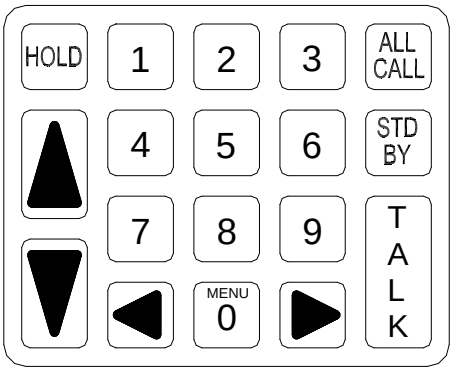


Figure 5. D-2400 Keypad

⚠ Important

All Selectors ship from the factory with a default ID number of 15. It is important to connect and power up each new selector, ONE SELECTOR AT A TIME, when installing a new system. Doing this allows you to change the ID number to a lower value (start at 1) and avoid the erratic behavior caused by multiple selectors sharing the same ID number.

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Keypad Function Definitions (Programming State)

Key functions are defined below.

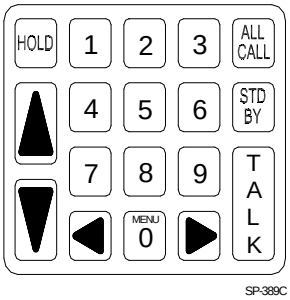

Figure 6. D-2400 Key-pad

Key	Function
HOLD (Shift)	Shifts between upper and lower case for text data.
UP ARROW	Increments data by 1. Fields wrap around.
DOWN ARROW	Decrements data by 1. Fields wrap around.
1	Enters the digit 1 for numeric entry. Enters the following for text entry: Unshifted: A B C 1 (Shifted: a b c 1)
2	Enters the digit 2 for numeric entry. Enters the following for text entry: Unshifted: D E F 2 [Shifted: d e f 2]
3	Enters the digit 3 for numeric entry. Enters the following for text entry: Unshifted: G H I 3 { Shifted: g h i 3 }
4	Enters the digit 4 for numeric entry. Enters the following for text entry: Unshifted: J K L 4 ← Shifted: j k l 4 →
5	Enters the digit 5 for numeric entry. Enters the following for text entry: Unshifted: M N O 5 : Shifted: m n o 5 ;

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<table>
<tr><th>Key</th><th>Function</th></tr>
<tr><td>6</td><td>Enters the digit 6 for numeric entry.
Enters the following for text entry:
<table><tr><td>Unshifted</td><td>P</td><td>Q</td><td>R</td><td>6</td><td>_</td></tr><tr><td>Shifted</td><td>p</td><td>q</td><td>r</td><td>6</td><td>|</td></tr></table></td></tr>
<tr><td>7</td><td>Enters the digit 7 for numeric entry.
Enters the following for text entry:
<table><tr><td>Unshifted</td><td>S</td><td>T</td><td>U</td><td>7</td><td>.</td></tr><tr><td>Shifted</td><td>s</td><td>t</td><td>u</td><td>7</td><td>!</td></tr></table></td></tr>
<tr><td>8</td><td>Enters the digit 8 for numeric entry.
Enters the following for text entry:
<table><tr><td>Unshifted</td><td>V</td><td>W</td><td>X</td><td>8</td><td>&</td></tr><tr><td>Shifted</td><td>v</td><td>w</td><td>x</td><td>8</td><td>@</td></tr></table></td></tr>
<tr><td>9</td><td>Enters the digit 9 for numeric entry.
Enters the following for text entry:
<table><tr><td>Unshifted</td><td>Y</td><td>Z</td><td>#</td><td>9</td><td>’</td></tr><tr><td>Shifted</td><td>y</td><td>z</td><td>,</td><td>9</td><td>“</td></tr></table></td></tr>
<tr><td>0/MENU</td><td>Enters the digit 0 for numeric entry.
Enters the following for text entry:
<table><tr><td>Unshifted</td><td>+</td><td>*</td><td>=</td><td>0</td><td><</td></tr><tr><td>Shifted</td><td>-</td><td>/</td><td>^</td><td>0</td><td>></td></tr></table></td></tr>
<tr><td>LEFT ARROW</td><td>Jump left to next data field.</td></tr>
<tr><td>RIGHT ARROW</td><td>Jump right to next data field.</td></tr>
<tr><td>ALL CALL</td><td>Exits the programming state and enters Off Line mode.</td></tr>
<tr><td>STD BY</td><td>Clear the data field to its default value (space for text or the default value).</td></tr>
<tr><td>TALK</td><td>Enter key where appropriate.</td></tr>
</table>

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Error Message

The system will display one error message: No Communication.

```
  ! E R R O R !
NO COMMUNICATION
```

The message occurs when there is no communications between the Selector and Controller. To correct this:

1. Be sure Controller is powered on.
2. Be sure pins 2 and 3 of J22 on the Controller are connected to pins 2 and 3 of J8 on the Selector. Polarity must be correct.

Parameter Selection

Memorized parameters are given below. These parameters are stored in the EEPROM. The 16-character by 2-row LCD displays the parameters.

```
01:Selector ID #
            {01}
```

A number (1 to 15 inclusive). Default = 15. This Number must be unique relative to all other Selector ID numbers used in the system.

```
02:Max Stations
            {16}
```

A number (1 to 16 inclusive). Total number of Call Stations in the system. Default = What the controller senses**.** Stations are numbered starting with 1 up to this value.

```
03:Alert Volume
            {08}
```

Selector. A number (1 to 15 inclusive). Default = 08.Adjusts the volume of the alert tone (Chime or Beep). A value of 15 is the loudest setting.

```
04:Alert Type
         {Chime}
```

Beep or Chime. Default = Chime.

```
05:VOX Enable
           {Off}
```

On or Off. Default = Off. Enables the VOX (Voice Activated Transmission) feature

```
06:VOX Sensitive
            {15}
```

A number (1 to 15 inclusive). Default = 15 (most sensitive)**.**

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```
07:Priority{Off}
S=xx: User Name
```

A value (Off, 1 to 16 inclusive). Priority station #, always moves to top of queue.

```
08:Auto Standby
```

On or Off. Enables the 30 second station connection time out. Default = On.

```
09:Station Name
S=xy: User Name
```

Assignment of station names 01 through Max Stations where xx indicates station #. Default = PUMP # xy, xy = station #.

```
10:Sync All Data
'T A L K' = Yes
```

Command to synchronize all Selectors with the data in the Controller and the Selector that issued the command.

```
 Are You Sure ?
'T A L K' = Yes
```

This confirmation message follows the above. Selectors must be On Line to be synchronized.

```
11:Software Rev.
Se=a.bc Con=x.vz
```

Read from Selector & Controller. Selector and Controller software revision numbers.

Re-Initializing the Selector

To re-initialize the Selector to its original factory settings:

1. Remove Power to the Selector.
2. Press the ALL CALL key.
3. Apply Power to the Selector.
4. Release the ALL CALL key.
5. Confirm the re-initialize procedure by pressing the TALK key. (To abort, press the STD BY key.)
6. Remember to adjust all of the parameters so that the Selector functions properly in its given installation.

```
Initialize All ?
'T A L K' = Yes
```


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Adjusting the System

Communications Controller

You must remove the cover from the Communications Controller to perform the following adjustments.

Outbound ALL CALL Volume Level

To set the outbound ALL CALL Volume Level:

1. Ask another attendant to stand near a Call Station that is not in use.
2. Press and hold the ALL CALL button on the Station Selector to make the connection to the Call Stations.
3. Speak to the attendant near the Call Station to determine if the volume is low, satisfactory, or high.
4. If the volume is unsatisfactory, adjust the ALL CALL volume control in the Communications Controller. (See Figure 8.) Turn clockwise to increase the volume, counter-clockwise to decrease it.
5. Repeat Steps 2 through 4 until the volume is satisfactory.

Outbound Talk Volume Level

To set the outbound talk volume, do the following:

1. Press the Station Selector number key representing the Call Station you have chosen.
2. Speak to the attendant at the Call Station to determine if the volume is low, satisfactory, or high.
3. If the volume is unsatisfactory, adjust TALK A in the Communications Controller (see Figure 7). Turn clockwise to increase the volume, counter-clockwise to decrease it.
4. Repeat Steps 2 and 3 until the volume is satisfactory.
5. Press STD BY on the Station Selector to cancel the connection to the Call Station.

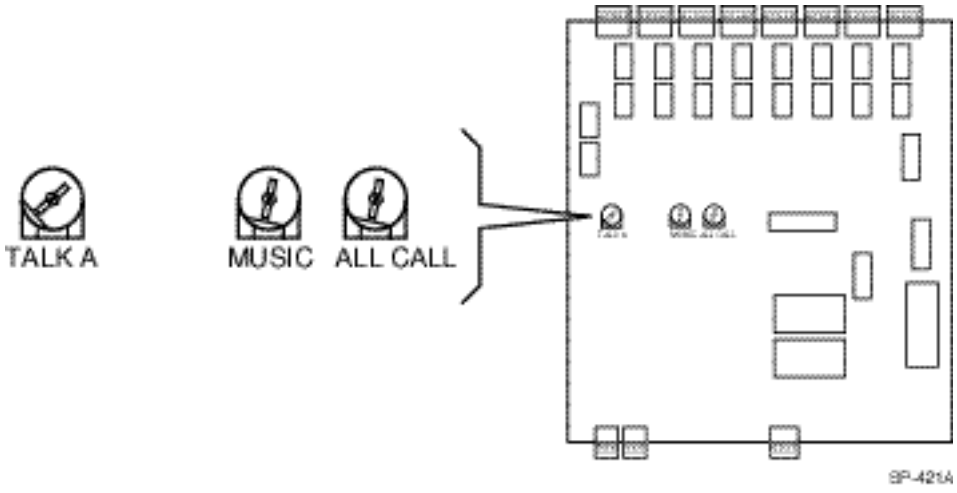

Figure 7. Communications Controller Volume Controls

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Outbound Music/Messaging Level (Only for Systems That Use Music/Messaging)

To set the outbound Music/Messaging level, do the following:

1. Ask another attendant to stand near a Call Station that is not in use and has Music/Messaging activated. (See the Communications Controller Hardware Section on Page 7 for details on how to activate Music/Messaging for a Call Station.)
2. Determine if the Music/Messaging volume is low, satisfactory, or high.
3. If the volume is unsatisfactory, adjust the MUSIC volume control in the Communications Controller. (See Figure 8.) Turn clockwise to increase the volume, counter-clockwise to decrease it.
4. Repeat Steps 2 and 3 until the volume is satisfactory.

Station Selector(s)

Inbound Audio Volume Level

To set the inbound audio volume level:

1. Ask an attendant to stand at a Call Station and push the incoming call button for your Station Selector.
2. Answer the call by pressing the TALK button.
3. As the attendant talks, adjust the up/down arrows on the Station Selector keypad to reach a desirable level.

VOX (Voice Activated Transmission) Sensitivity Level

⚠ **Important**
The VOX adjustments are necessary only if VOX is enabled for your system.

The VOX sensitivity level determines the maximum distance from the microphone that the speaker can activate communication.

⚠ **Important**
The suggested average activation distance from the microphone to the attendant is 2 to 6 inches.

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To set the VOX sensitivity level:

1. Follow the directions under the section *Programming the Selector* to put the Selector in Programming mode.
2. Locate the VOX Enable screen and be sure it is set to ON.
3. Locate the VOX Sensitive screen and press the right-arrow key to edit the value.
4. Use the up/down arrow keys to adjust sensitivity:
   - The up arrow key increases the sensitivity (lengthens the distance from the microphone to the attendant). Fifteen is most sensitive.
   - The down arrow key decreases sensitivity. One is least sensitive.
5. Press the ALL CALL key to exit Programming mode.

Testing the Functions

Perform the following tests after installing the Convenience Store Intercom System, Model D-2400:

1. Checking TALK/LISTEN switching.
   a. Ask an attendant to go to Call Station 1 and press the call button.
   b. Establish a connection with the CALL STATION (press TALK on the Station Selector or Remote Microphone).
   c. Talk and listen to the attendant to determine that the TALK and LISTEN modes are functioning satisfactorily.
   d. Repeat Steps a through c for all CALL STATIONS.
2. Checking ALL CALL.
   a. Ask an attendant to go to a Call Station.
   b. Activate ALL CALL (press and hold ALL CALL on the Station Selector or Remote Microphone).
   c. Broadcast an announcement from the Station Selector.
   d. Ask the attendant to verify that the message is broadcast from all CALL STATIONS.

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Training Users

Train users of the Convenience Store Intercom System, Model D-2400, by performing the following steps:

1. Powering the system up (it should remain on).
2. Answering a call.
3. Initiating a call.
4. Adjusting inbound volume.
5. Operation of any applicable equipment.
    - Remote Microphone.
    - Music/Message unit.

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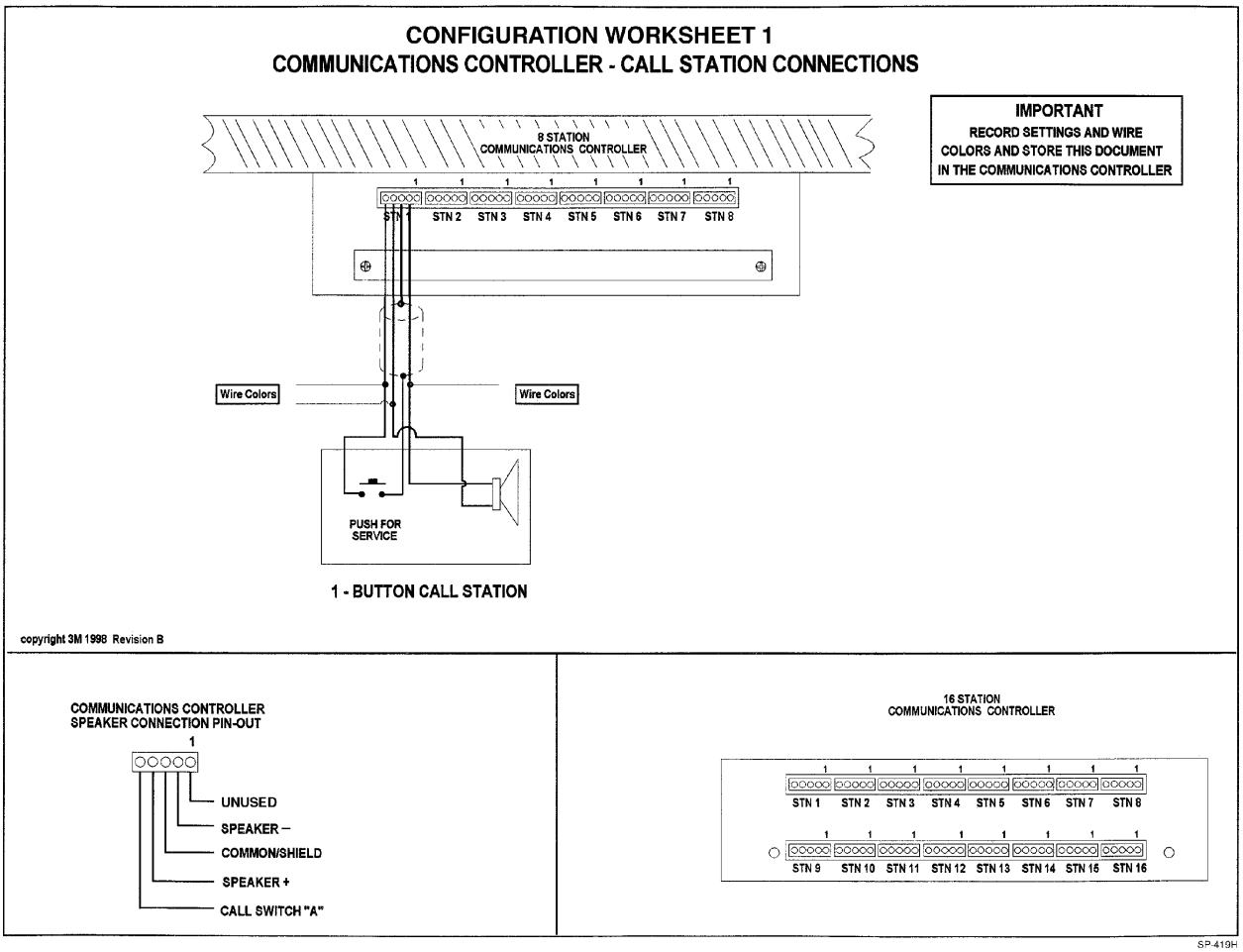
Configuration Worksheets



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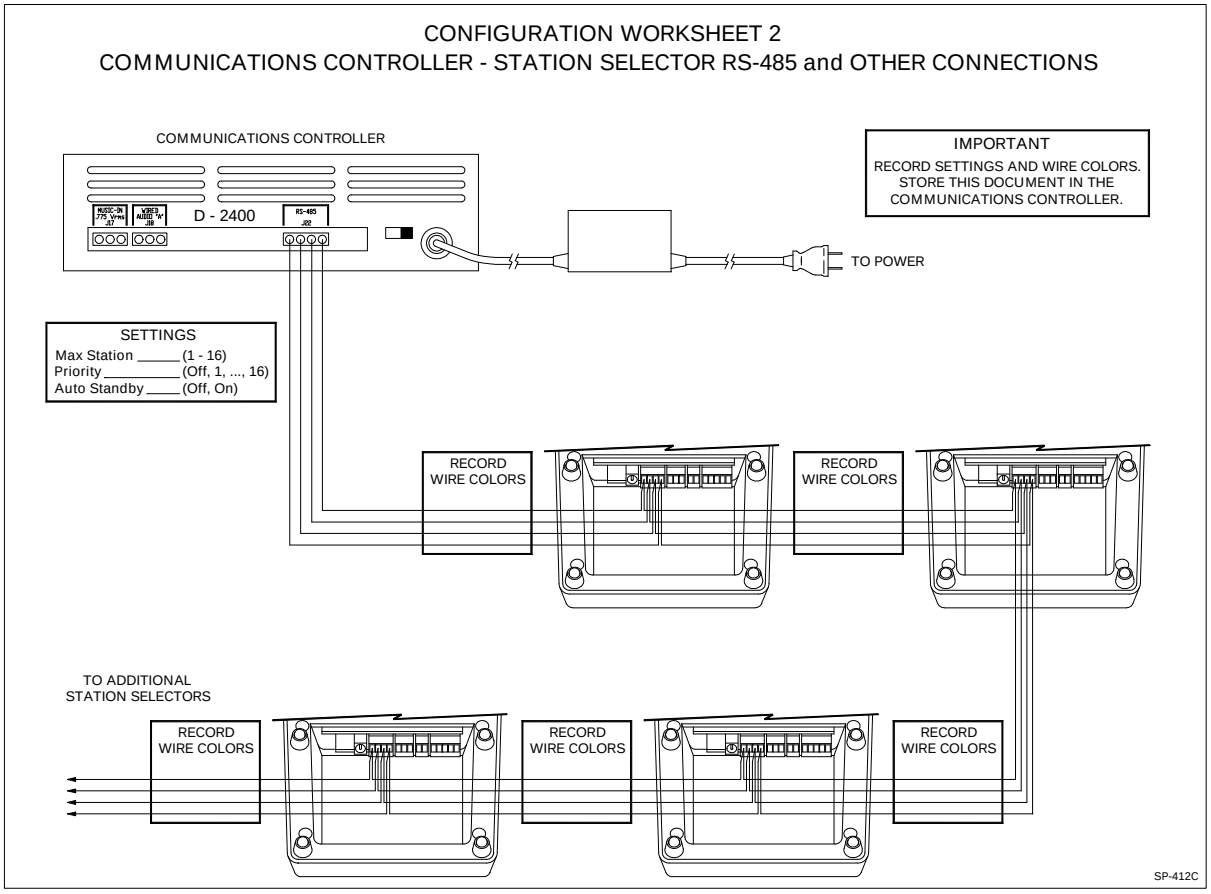

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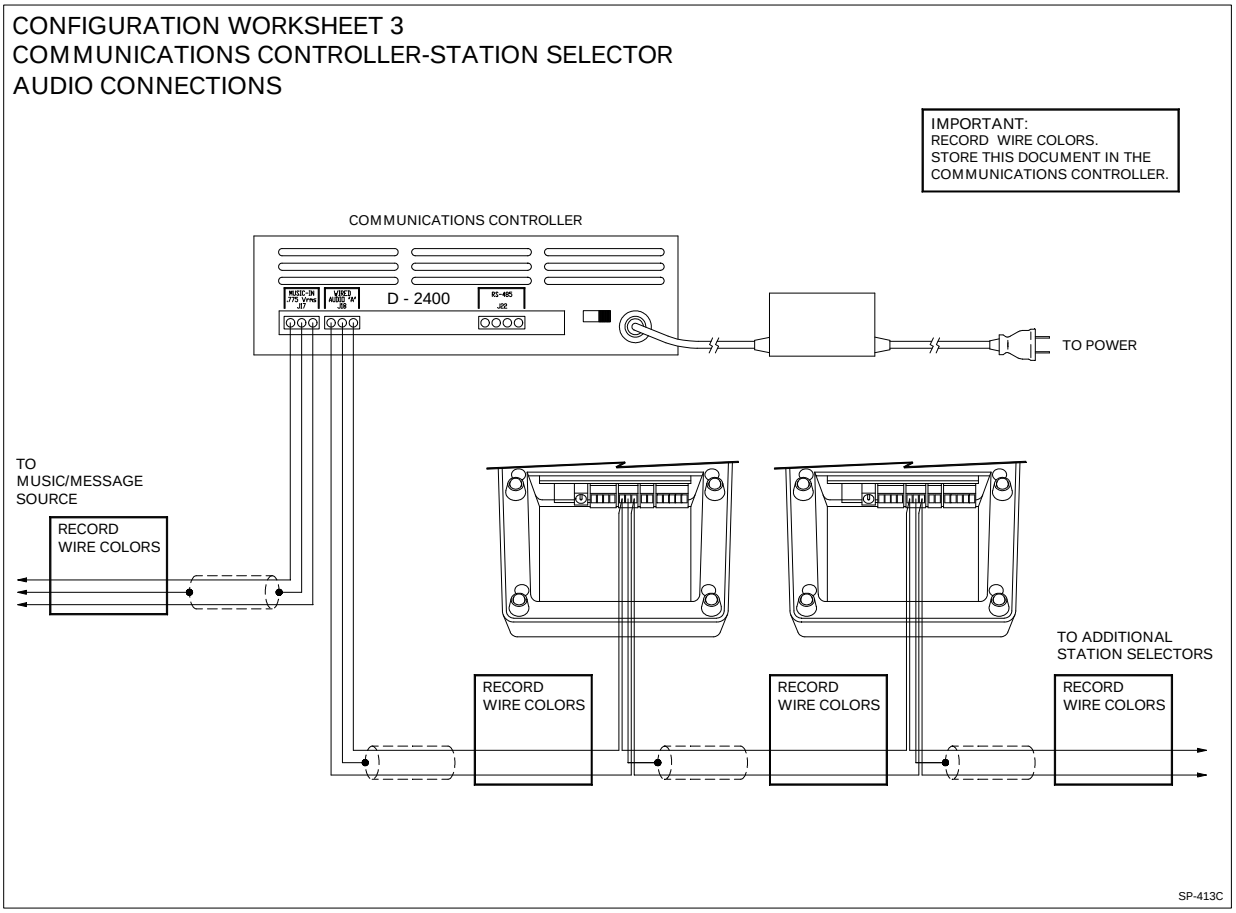
CONFIGURATION WORKSHEET 3
COMMUNICATIONS CONTROLLER-STATION SELECTOR
AUDIO CONNECTIONS



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